

On January 9, 2014, an estimated 7,500 gallons of 4-methylcyclohexane methanol (MCHM), which is used in coal processing, leaked from a ruptured container into the Elk River. The spill, just one mile upstream from a water-treatment plant, forced officials to ban residents and businesses in nine West Virginia counties from using the water for anything other than flushing toilets or fighting fires. An estimated 300,000 West Virginia residents were affected by the spill. The Incident Command Tool for Drinking Water Protection (ICWater) was used to model time-of travel and concentration of MCHM. It was designed to answer four critical questions: (1) where is the contaminant going, (2) is there a drinking water intake in its path, (3) when will it reach drinking water and (4) is its level high enough to be a human threat. ICWater uses the National Hydrography Dataset Plus (NHDPlus) river network for downstream and upstream tracing of contaminants. The NHDPlus contains more than 3 million stream and river reaches, all hydrologically connected. Mean flow volume and velocity are attributes of each reach in the network. USGS real-time stream flow gauges are linked to the network to update the mean flows and velocities to reflect actual conditions. The difference between the updated mean velocity in ICWater and the measured velocity on the Kanawha River (USGS gauge 03198000, just downstream of the spill and Charleston, WV intake) was less than 3 percent. The system also contains locations of industrial and municipal dischargers such as the spill site on the Elk River. It is also linked to the EPA Safe Drinking Water Information System to provide data on population served by each water utility downstream of the spill. Downstream tracing was initiated at the spill site to forecast the location of the leading edge, peak concentration and trailing edge of the plume for drinking water intakes as far downstream as 200 miles. The Greater Cincinnati Water Works (GCWW) collected water samples on the Ohio River to monitor for the presence of MCHM. GCWW also performed ICWater model runs based on MCHM measurements at downstream locations on the Ohio River to provide more accurate forecasts to nearby water intakes. GCWW shut down its intakes shortly before midnight on Tuesday, January 14 as a precautionary measure to protect its drinking water supply. The water utility re-opened its intakes at approximately 2 pm on January 16. Data for Cincinnati showed good agreement (within several hours) between the observed peak time of arrival and the model estimated peak time. The leading edge predictions were also close to the observations.